

# Cold Injury Prevention

*Diane C. Rackers  
Office of Epidemiology*

Bitterly cold weather is a significant hazard to life in our nation and in Missouri. During the past ten winters, 123 Missourians died from cold exposure and about half of these were age 65 and over. During last winter, 13 deaths due to cold-related causes were reported, 10 of those deaths were in individuals age 65 and over.

This emphasizes a need to be very supportive of the elderly, who are often homebound and bedfast and are particularly vulnerable to hypothermia due to having less fatty tissue insulation, impaired shivering mechanism, lower metabolic rates, chronic illnesses, limited mobility and less perception of the cold. They may also be trying to reduce expenditures on heating and may gradually get so cold that their body temperature falls below a critical level, and even at temperatures well above the freezing mark, they quietly die.

The very young are also highly vulnerable to hypothermia, but society protects them well. Babies should have sleeping rooms maintained at temperatures that feel comfortable to you and should have multiple layers of clothing and blankets that do not restrict the baby's breathing or movement.

The homeless and disadvantaged are also at great risk for hypothermia. Other risk factors associated with injury and death from the cold include alcohol use, certain illnesses and some medications that affect the nervous and vascular systems.

Illnesses that may adversely affect a person's response to cold temperatures include:

- Hypothyroidism and other disorders of the body's hormone system
- Stroke and other disorders that cause paralysis or reduce awareness

## **Precautions to prevent cold-related injury:**

- ✱ Wear several layers of warm, loose-fitting clothes.
- ✱ Sleep with plenty of blankets.
- ✱ Eat hot, nutritious meals.
- ✱ Maintain daily contact with some other person outside of your home.
- ✱ Avoid the use of alcoholic beverages.
- ✱ If able, exercise lightly to increase body heat.
- ✱ Place emergency phone numbers in a handy place.
- ✱ Check with your physician to see if the medications you take will affect your body temperature.
- ✱ Plan for cold weather emergencies such as a power outage or being stranded in your car.

- Severe arthritis, Parkinson's disease and other illnesses that limit activity
- Any condition that reduces the normal flow of blood
- Memory disorders

Medications reported to contribute to core temperature depressions include: Acetaminophen, Atropine, Barbiturates, Benzodiazepines, Bethanechol, Bromocriptine, Butyrophenones, Chloral hydrate, Clonidine, Cyclic antidepressants, Glutethimide, Lithium, Morphine, Nicotinic acid, Organophosphates, Phenformin, Phenothiazines, Reserpine and Tetrahydrocannabinol.

Hypothermia may develop out-of-doors and may be accompanied by frostbite especially when the wind chill factor is very low. As the speed of the wind increases, it carries heat away from the body much more quickly. When there are high winds, serious weather-related health problems are more likely, even when temperatures are only cool. See Wind Chill Factor Chart on page 18. Hypothermia can also occur at cool temperatures if a person becomes chilled from rain, sweat or submersion in cold water.

Another winter hazard is carbon monoxide poisoning, which can cause injury to the brain and the heart, resulting in permanent damage or death. Carbon monoxide poisoning can occur with the use of gas or kerosene heaters and indoor use of charcoal briquets for the purpose of either home heating or cooking because of an electrical power outage. In 1995, 47 cases of carbon monoxide poisoning were reported in Missouri.

Increased awareness is the most effective way to prevent and treat hypothermia. Health professionals should alert their high risk patients to the dangers of hypothermia and ways to prevent it. When prescribing medications, physicians should inform patients regarding any expected effects on core body temperature. Doctors, nurses and health professionals—including those working in emergency rooms—should remember to check patients for hypothermia.

Hypothermia and carbon monoxide poisoning are reportable in Missouri. Physicians are urged to report cases promptly to their local health departments.

# WIND CHILL FACTOR CHART

Cooling Power of Wind on Exposed Flesh Expressed as an Equivalent Temperature (under calm conditions)												
Estimated wind speed (in mph)	Actual Thermometer Reading (°F.)											
	50	40	30	20	10	0	-10	-20	-30	-40	-50	-60
calm	Equivalent Temperature (°F.)											
	50	40	30	20	10	0	-10	-20	-30	-40	-50	-60
5	48	37	27	16	6	-5	-15	-26	-36	-47	-57	-68
10	40	28	16	4	-9	-24	-33	-46	-58	-70	-83	-95
15	36	22	9	-5	-18	-32	-45	-58	-72	-85	-99	-112
20	32	18	4	-10	-25	-39	-53	-67	-82	-96	-110	-124
25	30	16	0	-15	-29	-44	-59	-74	-88	-104	-118	-133
30	28	13	-2	-18	-33	-48	-63	-79	-94	-109	-125	-140
35	27	11	-4	-21	-35	-51	-67	-82	-98	-113	-129	-145
40	26	10	-6	-21	-37	-53	-69	-85	-100	-116	-132	-148
(wind speeds greater than 40 mph have little additional effect.)	LITTLE DANGER (For properly clothed person) Maximum danger of false sense of security.				INCREASING DANGER Danger from freezing of exposed flesh.				GREAT DANGER			
Trenchfoot and immersion foot may occur at any point on this chart.												

**INSTRUCTIONS:** Measure local temperature and wind speed if possible; if not, **estimate**. Enter table at closest 5°F interval along the top and with appropriate wind speed along left side. Intersection gives approximate equivalent chill temperature—that is, the temperature that would cause the same rate of cooling under calm conditions.

## NOTES:

1. Wind may be calm but freezing danger great if person is exposed in moving vehicle, under helicopter rotors, in propeller blast, etc. It is the rate of relative air movement that counts and the cooling effect is the same whether you are moving through the air or it is blowing past you.
2. Effect of wind will be less if person has even slight protection for exposed parts—light gloves on hands, parka hood shielding face, etc.

**ACTIVITY:** Danger is less if subject is active. A person produces about 100 watts (341 BTUs) of heat standing still but up to 1,000 watts (3,413 BTUs) in vigorous activity like cross-country skiing.

**PROPER USE OF CLOTHING** and **ADEQUATE DIET** are both important.

**COMMON SENSE:** There is no substitute for it. The table serves only as a guide to the cooling effect of the wind on bare flesh when the person is first exposed. General body cooling and other factors affect the risk of freezing injury.